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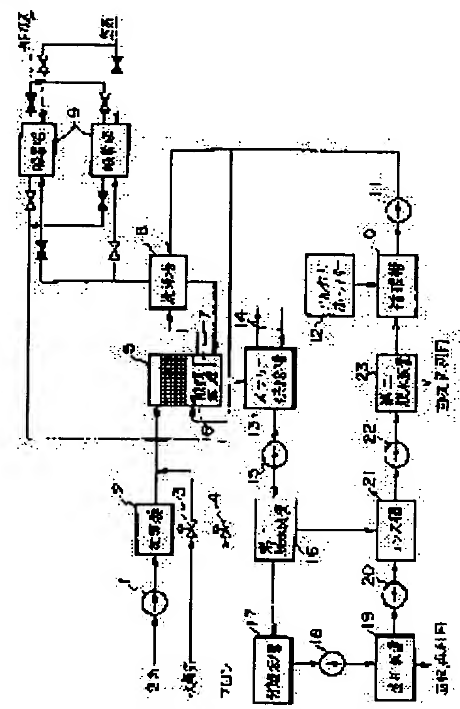
(54) TREATMENT OF DECOMPOSED FLUOROCARBON WASTE GAS

(57)Abstract:
PURPOSE: To effectively treat waste gas produced by decomposing fluorocarbon and to recover effective components by continuously and quantitatively treating decomposed fluorocarbon gas with a circulation liquid to which alkali is added, separating solid matter and dissolved salt and reusing the circulation liquid.
CONSTITUTION: After air being carrier gas is heated and its flow rate is adjusted, it is mixed with fluorocarbon. This gaseous mixture is introduced into a catalyst vessel 5 and is decomposed into hydrogen chloride, hydrogen fluoride, carbon dioxide and the like. The decomposed gas is led to a scrubber 8 and is neutralized with a circulation liquid to which alkali is added to form dissolving chloride and solid matter of fluoride. The circulation liquid containing these is led to a slurry feeding tank 13 and is completely neutralized and is cooled. Then the circulation liquid is dehydrated by the 1st dehydrator 19 to separate calcium fluoride, and further, the dissolved components are separated by an electrodialysis device 19, and the calcium chloride is removed by the 2nd dehydrator 23. The circulation liquid is led to a circulation tank 10, and alkali is added from an alkali hopper to reuse the circulation liquid.



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CLAIMS

[Claim(s)]
[Claim 1] In the technique of processing the exhaust gas generated when the chlorofluocarbon which contains chlorine and a fluorine as a component is disassembled The saturation process which generates the solution which neutralizes the hydrogen chloride and hydrogen fluoride which add an alkaline-water solution continuously to an emission, and are included in exhaust gas, and contains a soluble chlorination salt and a fluoride salt solid, The dehydration process which extracts the fluoride salt solid which dehydrated the solution containing a soluble chlorination salt and a fluoride salt solid, and became wet, The electrodialysis process which removes a soluble chlorination salt from the solution after an extraction of a fluoride salt solid, and purifies a solution, the alkaline-water solution generation process which adds alkali in the purified solution and is supplied to a saturation process -- since -- the art of the chlorofluocarbon decomposition exhaust gas characterized by being constituted and circulating a solution through each process
[Claim 2] In the technique of processing the exhaust gas generated when the chlorofluocarbon which contains chlorine and a fluorine as a component is disassembled The saturation process which generates the solution which neutralizes the hydrogen chloride and hydrogen fluoride which add an alkaline-water solution continuously to an emission, and are included in exhaust gas, and contains a soluble chlorination salt and a fluoride salt solid, The first dehydration process which extracts the fluoride salt solid which dehydrated the solution containing a soluble chlorination salt and a fluoride salt solid, and became wet, The electrodialysis process which removes a soluble chlorination salt from the solution after an extraction of a fluoride salt solid, and purifies a solution, The rinse process which washes the fluoride salt solid extracted at the dehydration process with the purified solution in cold water, The second dehydration process which dehydrates the solution containing the fluoride salt solid washed in cold water, and collects fluoride salt solids, the alkaline-water solution generation process which adds alkali in the solution after fluoride salt solid recovery, and is supplied to a saturation process -- since -- the art of the chlorofluocarbon decomposition exhaust gas characterized by being constituted and circulating a solution through each process
[Claim 3] The art of the chlorofluocarbon decomposition exhaust gas according to claim 1 or 2 characterized by collecting the chlorination salts removed at the aforementioned electrodialysis process.
[Claim 4] The art of the chlorofluocarbon decomposition exhaust gas according to claim 1, 2, or 3 characterized by adding the alkali of the equivalent required to neutralize the hydrogen chloride and hydrogen fluoride which are included in the aforementioned emission.
[Claim 5] The amount of the aforementioned alkali which carries out addition is the art of the chlorofluocarbon decomposition exhaust gas of the claim 4 characterized by setting up more superfluously than the equivalent calculated by the reaction formula which neutralizes the hydrogen chloride included in the aforementioned emission, and hydrogen fluoride.
[Claim 6] The art of the chlorofluocarbon decomposition exhaust gas according to claim 5 characterized by being a first dehydration process's entering side, adding an acid continuously in a solution, and neutralizing the residual alkali in a solution.
[Claim 7] The aforementioned acid is the art of the chlorofluocarbon decomposition exhaust gas of the claim 6 characterized by being a hydrochloric acid.
[Claim 8] In the technique of processing the exhaust gas generated when the chlorofluocarbon which does not contain chlorine as a component including a fluorine is disassembled The saturation process which generates the solution which neutralizes the hydrogen fluoride which adds an alkaline-water solution continuously to an emission, and is included in exhaust gas, and contains a fluoride salt solid, The dehydration process which extracts the fluoride salt solid which dehydrated the solution containing a fluoride salt solid and became wet, the alkaline-water solution generation process which adds alkali in the solution after an extraction of a fluoride salt solid, and is supplied to a saturation process -- since -- the art of the chlorofluocarbon cracked gas characterized by being constituted and circulating a solution through each process
[Claim 9] The amount of the aforementioned alkali which carries out addition is the art of the chlorofluocarbon decomposition exhaust gas of the claim 8 characterized by setting up more superfluously than the equivalent calculated by the reaction formula which neutralizes the hydrogen fluoride included in the aforementioned emission.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] this invention relates to the art of the exhaust gas generated when chlorofluocarbon is disassembled.
[0002]
[Description of the Prior Art] Chlorofluocarbon attracts attention as matter which an ozone layer is destroyed [matter] in recent years and worsens earth environment, and it is determined that chlorofluorocarbon (CFC) is abolished by A.D. 1996 and abolition and hydro chlorofluorocarbon (HCFC) are abolished by A.D. 2030 by the Montreal Protocol.
[0003] Then, the decomposition harmless-ized technique of chlorofluocarbon is examined variously, and the research of a catalyst part solution method, a plasma part solution method, a combustion part solution method, a cement-kiln part solution method, an ultraviolet-rays part solution method, an electron ray part solution method, a super-criticality moisture solution method, a radiolysis method, a detonation part solution method, etc. is advanced until now. Also in which [these] technique, hydrogen fluoride or a fluorine and a hydrogen chloride, or chlorine occurs simultaneously as a decomposition product of chlorofluocarbon, and since these have high detrimental nature as the issue is regulated by the Clean Air Act, it is required to process exhaust gas.
[0004] As a property of chlorofluocarbon decomposition exhaust gas, the yield of exhaust gas other than the concurrence of hydrogen fluoride or a fluorine and a hydrogen chloride, or chlorine is sometimes large as compared with the throughput of chlorofluocarbon. For example, the amounts of the hydrogen fluoride which in the case of the chlorofluocarbon 113 ($C_2Cl_3F_3$) which is one of most chlorofluocarbon of the amount used is generated when 1kg of chlorofluocarbon 113 is processed, and a hydrogen chloride are 0.32kg and 0.58kg, respectively, when these are further neutralized by the calcium hydroxide, the amount of the generated calcium fluoride and a calcium chloride is set to 0.62kg and 0.89kg, respectively, and the total quantity reaches by about 1.5 times the chlorofluocarbon throughput.
[0005] In addition, it is shown by the following chemical formula when the example of the decomposition processing reaction of chlorofluocarbon 113 is shown.
$C_2Cl_3F_3+3H_2O \rightarrow CO_2+CO+3HF+$ -- a chemical formula is as follows when HF and HCl which were generated further 3 HCl are neutralized by the calcium hydroxide
It is shown by the following formula when neutralizing by the 2HF+calcium(OH) 2 ->CaF_2+2H_2O2HCl+calcium(OH) 2 ->$CaCl_2+2H_2O$ sodium hydroxide.
A reaction is shown by the following formula when it decomposes under $HF+NaOH \rightarrow NaF_2+H_2O$$HCl+NaOH \rightarrow NaCl+H_2O$ and an elevated temperature.
In processing by the sedimentation of $2C_2Cl_3F_3+4O_2 \rightarrow 4CO_2+3Cl_2+3F_2$ therefore the conventional art, for example, a scrubbing tower, and washing drainage etc., an offgas treatment facility will become very big as compared with a decomposition processing facility of chlorofluocarbon, and will spoil greatly the economical efficiency of the whole chlorofluocarbon decomposition processing facility.
[0006] On the other hand, although the saturation product of chlorofluocarbon decomposition exhaust gas is the high matter of the usefulness like a calcium fluoride as mentioned above, since chlorofluocarbon is processed independently in many cases, the amount of mixing of impurities other than a hydrogen chloride is very small, and it is effectively reusable if the chlorine compound which carries out saturation generation simultaneously is removed efficiently. However, since the amount of undissolved fluorine compounds, such as that a settling time needs to be secured and a generated calcium fluoride, is large, the sedimentation technique of the conventional drainage also about this will take a mass sedimentation facility, and the economical efficiency of the whole chlorofluocarbon decomposition processing facility will be greatly spoiled by it. A lot of drainage which multiple times need to be washed in cold water in the fluorine compound which furthermore sedimented in order to obtain the fluorine compound of the high grade which is useful since soluble chlorine compounds (calcium chloride etc.) are intermingled, and is generated in that case will spoil the economical efficiency of a chlorofluocarbon decomposition processing facility much more.
[0007] Moreover, when the fluorine concentration under drainage is regulated by 15 ppm or less and is carrying out self-imposed control severer than this by some local self-governing body further, as for fluorine inclusion drainage, for a certain reason, processing with advanced fluorine inclusion drainage is needed by Water Pollution Control Law. However, by technique, such as the conventional coagulation sedimentation, while drainage occurs in large quantities, a settling tank large-sized because of reservation of a settling time will be needed, a waste-water-treatment facility of large capacity [point / this] will be required, and

the economical efficiency of a chlorofluocarbon decomposition processing facility will be spoiled.
[0008]
[Problem(s) to be Solved by the Invention] Thus, when it applies to the exhaust gas which generates the art of the exhaust gas in the former when chlorofluocarbon is disassembled, various problems are to process exhaust gas efficiently and carry out recovery reuse of the useful saturation product of exhaust gas efficiently, and there is no technique still completed even in the utilization phase. Then, the chlorofluocarbon decomposition processing technique itself is not completed, but the development of the art of chlorofluocarbon decomposition exhaust gas was desired also from this viewpoint.
[0009] It was made in order that this invention might solve such a conventional technical probrem, and the place made into the purpose processes efficiently the exhaust gas generated when chlorofluocarbon is disassembled, and it is in offering how a small-scale facility recovers a useful component.
[0010]
[Means for Solving the Problem and its Function] The art of the 1st chlorofluocarbon decomposition exhaust gas of this invention processes the exhaust gas which disassembled chlorofluocarbon with a continuity and the circulation liquid which adds alkali quantitatively, and separates continuously the solid generated by saturation, and the dissolved salt from circulation liquid, and carries out the reuse of the circulation liquid.
 [0011] The art of the 2nd chlorofluocarbon decomposition exhaust gas of this invention The exhaust gas which disassembled chlorofluocarbon is processed with a continuity and the circulation liquid which adds alkali quantitatively. After mixing the solid which separates continuously the solid generated by saturation, and the dissolved salt from circulation liquid, and was separated with the circulation liquid from which both were removed and carrying out the lysis elimination of the impurities in a solid (fusibility salt etc.), a solid is separated again and the reuse of the circulation liquid is carried out.
[0012] The art of the 3rd chlorofluocarbon cracked gas of this invention processes the exhaust gas which disassembled chlorofluocarbon with a continuity and the circulation liquid which adds alkali quantitatively, and separates continuously the solid generated by saturation from circulation liquid, and carries out the reuse of the circulation liquid.
[0013] The art of the chlorofluocarbon decomposition exhaust gas of the 1st and 2 makes the processing object the chlorofluocarbon which contains chlorine and a fluorine as a component for chlorofluorocarbon (CFC), hydro chlorofluorocarbon (HCFC), etc. By the 1st technique, after separating a solid from circulation liquid by the 2nd technique to a solid being separated from circulation liquid, it washes in cold water by purified circulating water, an impurity is lessened, and purity is raised.
[0014] The art of the 3rd chlorofluocarbon decomposition exhaust gas is aimed at a hydro fluorocarbon (HFC), i.e., the chlorofluocarbon which there is no chlorine and contains a fluorine as a component, and does not have the process which separates the dissolved salt [in the 1st and the 2nd art therefore].
[0015] Next, the art of the 2nd chlorofluocarbon decomposition exhaust gas containing the process of the art of the 1st and 3 is explained in full detail. The exhaust gas (it is named a harmful gas generically below.) containing the hydrogen fluoride generated by disassembly of chlorofluocarbon or a fluorine and a hydrogen chloride, or chlorine is introduced into a scrubbing tower. Although this scrubbing tower is selected according to a packed column, a spray tower, a cyclone scrubber, a venturi scrubber, the concentration of the harmful gas which it gets wet and 1 of ****, a crossflow contactor, a plate column, a bubbling tower, a jet scrubber, leakage ****, etc. or two or more generate, and temperature, all carry out the absorption saturation of the harmful-gas component in exhaust gas into a liquid by contact of exhaust gas and a liquid.
[0016] To the scrubbing tower, a continuity and the liquid which has alkali added quantitatively circulate, and a harmful gas is absorbed by this circulation liquid. As alkali, a calcium hydroxide, a sodium hydroxide, a calcium carbonate, a sodium carbonate, etc. can be used. It counteracts with a harmful gas in circulation liquid, and, as a result, such alkali forms a saturation product in the type of a fluorine compound and a chlorine compound.
[0017] After discharging these saturation products from a scrubbing tower, they are recoverable in the type of a solid as a useful object. In order to collect these from circulation liquid in the type of a high grade more, the purity of the useful object which can make the minimum the superfluous alkali component in circulation liquid, and collects the alkali of the equivalent required for saturation processing of the decomposition exhaust gas and the same amount for the addition of alkali as ****** a continuity and by supplying quantitatively according to the modality of chlorofluocarbon for decomposition and a throughput can be improved. That is, since useful solids are collected where moisture is included, if the impurity is contained in this moisture, the purity of a recovery useful object will fall. Moreover, since useful objects are collected as a solid even if solids other than a useful object are in circulation liquid, the purity of a useful object falls. Since the purity of the useful object separated and collected simultaneously [with the useful solid which separated the alkali component of difficulty water solubility which is not case / the component / among these melted] like a calcium hydroxide and a calcium carbonate in the alkali added especially is spoiled or re-saturation operation of superfluous alkali is needed, this point is important in this invention.
[0018] Furthermore, especially in hydrogen fluoride or a fluorine, since the saturation product of difficulty solubility to generate forms a complicated hydrate near the neutralization-equivalent point and serves as colloid, trouble may be caused in the separation by dehydration of a solid performed by the lower-stream-of-a-river side. Therefore, the amount of the alkali to add needs to add to the luxus a little rather than the equivalent required for saturation of decomposition exhaust gas in the domain which does not spoil required purity, and to make circulation liquid into predetermined superfluous alkalinity as a recovery useful component. This predetermined superfluous alkalinity changes with alkali to use.
[0019] As an adjustment means of the addition of alkali, means to control the addition of alkali strictly, and also to add an acid continuously in circulation liquid in this invention can also be taken. Since the domain of PH to the aforementioned predetermined

superfluous alkalinity is known beforehand, superfluous alkalinity is controllable by carrying out feedback control of the amount of the acid which detects PH of circulation liquid and is continuously added based on it in a predetermined domain.
[0020] It is enabled to collect, without spoiling the purity of the calcium chloride which makes the saturation salt generated by using a hydrochloric acid in this invention the already contained calcium chloride, and collects them, since the calcium chloride is already contained in the circulation liquid which processes chlorofluocarbon decomposition exhaust gas, although the acid to add can use a hydrochloric acid, a sulfuric acid, a nitric acid, etc.
[0021] It contains fluorine compounds, such as a calcium fluoride of difficulty solubility, and a sodium fluoride, and chlorine compounds, such as a soluble calcium chloride and a sodium chloride, using as a saturation product the circulation liquid which carried out the absorption saturation of the harmful gas by the scrubbing tower.
[0022] The precipitation solid of the parvus calcium fluoride of solubility or a sodium fluoride is first separated from the circulation liquid discharged from the scrubbing tower. As a separation means of a solid, although there are meanses, such as dehydration, vaporization concentration, and sedimentation, as a means to separate only a solid from circulation liquid quickly continuously, dehydration is the optimum. All can be used although meanses, such as a centrifugal hydroextraction, the filter press, a belt press, and vacuum dehydration, are in the dehydration technique.
[0023] Soluble salts, such as a calcium chloride, are succeedingly removed from the circulation liquid with which the solid was separated. As a means to remove the soluble salt which exists by the ionic state, although there are electrodialysis, reverse osmosis membrane processing, ion exchange, etc., as a means to separate only a soluble salt quickly, the electrodialyses is the optimum.
[0024] Since the sequence of carrying out elimination of the solid from the aforementioned circulation liquid and elimination of a soluble salt may shorten theoretically the life of the ion exchange membrane used by the electrodialyses when a high-concentration solid exists in circulation liquid by the electrodialyses in this invention for which a soluble salt is removed, although not specified, after it removes a solid first, it leads to removing a soluble salt carrying out this invention efficiently.
[0025] The solid separated from circulation liquid by dehydration can carry out recovery reuse as it is, when purity has reached the purity demanded from the mission used as a useful object. However, since the solid which the chlorine compound is intermingled by the ionic state as a soluble salt as mentioned above in the saturation product of chlorofluocarbon decomposition exhaust gas in many cases, and can be obtained by dehydration usually contains 75 - 85% of moisture, impurities (soluble salt etc.) exist in this moisture, and it is insufficient of purity in many cases. To this, the content of a soluble salt can be aimed at the solid after dehydration with a few liquid, and enhancement in purity can be aimed at by washing in cold water and dehydrating again. However, introducing water from the exterior has the fault that a displacement increases.
[0026] In this invention, the purity of the solid separated, without the circulation liquid whose content of a soluble salt removed the soluble salt by the aforementioned electrodialyses and decreased performing this washing in cold water, and introducing water from the exterior (i.e., without it having increased the displacement) can be raised.
[0027] Although the soluble salt removed from circulation liquid by the electrodialyses is discharged from an electrodialyzer in the type of little concentration liquid, in the case of chlorofluocarbon decomposition exhaust gas, this is the aqueous solutions, such as a calcium chloride of a high grade, and a sodium chloride. If concentration, xeransis, etc. still need to be operated and the cost which it takes is considered in order to make it the solid gestalt used in general industry, although this may be collected and reused since a calcium chloride and a sodium chloride are matter extensively used in general industry, not necessarily reusing is not a best policy economically. Therefore, by the case, these will be discharged as drainage.
[0028] In order that the drainage which generally contains a fluorine or a fluorine compound may satisfy severe regulation of Water Pollution Control Law, it needs many operations, such as coagulation sedimentation, and requires many facilities, such as a saturation facility relevant to it. In this invention, almost all fluorine compounds (CaF_2, NaF, etc.) are separated for this drainage from circulation liquid by dehydration processing as a solid. Subsequently, an ion component is separated from circulation liquid by carrying out electrodialysis processing of the circulation liquid from which the solid was removed by dehydration processing. The detailed solid contents (CaF_2, NaF, etc.) from which most salts ($CaCl_2$, NaCl, etc.) melted at this time were not separated by dehydration processing while it dissociated from circulation liquid cannot penetrate ion exchange membrane, but remain in a circulation liquid side.
[0029] Only an ion component exists in the liquid separated by the electrodialyses. Although F^+ ion also exists in this, since the solubility of CaF_2 is 8 ppm, it can satisfy 15 ppm of effluent standards enough. Although solubility is larger than CaF_2 in NaF, it is only an ion component and F^+ ion can be lowered easily.
[0030]
[Example] Although an example is shown below, this invention is not limited to this.
(Example 1) this example is an example which processes the chlorofluocarbon decomposition exhaust gas generated when a chlorofluocarbon decomposition processor decomposes chlorofluocarbon 11 (CCl_3F), and the equipment used here carries out decomposition processing of the chlorofluocarbon with the processing speed of 50kg/h using a catalyst. A schematic diagram is shown in drawing 1 .
[0031] After supplying the air of about 260Nm3/h to a heater (2) with a blower (1) and heating it as carrier gas of chlorofluocarbon, chlorofluocarbon is heated to the temperature of about 430 degrees C required for the decomposition by the catalyst by mixing the steam supplied through a flow control valve (3), and the chlorofluocarbon supplied through a flow control valve (4). The concentration of chlorofluocarbon is about three mol %.
[0032] what is used in order that a steam may supply hydrogen required for the decomposition by the catalyst of chlorofluocarbon,

and oxygen -- it is -- the modality of chlorofluocarbon, and a throughput -- responding -- 1.0- of the equivalent required for decomposition -- it supplies about 3.0 times The amount of supply of a steam is controlled to go into this domain.
[0033] Since temperature falls by mixture with chlorofluocarbon, the air before mixture sets up the temperature of the air before mixture more highly from temperature required for the decomposition by the catalyst so that it may become more than the temperature that needs the temperature after the mixture with chlorofluocarbon for the decomposition by the catalyst of chlorofluocarbon. Moreover, the temperature of the air before mixture sets up the amount of supply of air and a steam so that the partial decomposition temperature of chlorofluocarbon may not be exceeded, and it controls each amount of supply. Moreover, the output of a heater (2) is controlled for the temperature of air to become below the partial decomposition temperature of chlorofluocarbon, and to become more than the temperature which needs the temperature after the mixture with chlorofluocarbon for the decomposition by the catalyst of chlorofluocarbon.
[0034] Since a steam generates the heating means of a heater (2) as products of combustion using the combustion burner which used the hydrocarbon propellant, it can fill up a steam required for a decomposition reaction.
[0035] The mixed gas of the air and the steam which were heated by the predetermined temperature requirement, and chlorofluocarbon is introduced into a catalyst container (5), and is decomposed into a hydrogen chloride, hydrogen fluoride, a carbon dioxide, etc. by catalytic reaction. Decomposition-reaction heat is applied in heated temperature of about 430 degrees C, and the exhaust gas after decomposition is discharged at about 450 degrees C. Hydrogen fluoride and 7.3kg /of 39.8kg /of hydrogen chlorides are generatedh h, respectively.
[0036] Since corrosive is very high, the hot hydrogen chloride which occurs by decomposition, and hydrogen fluoride ease the corrosive environment of the equipment after it in this invention by cooling the cracked gas with corrosive [hot] in the interior of a catalyst container (5).
[0037] The domain with a severe corrosive environment is made into the minimum as a means of cooling, and the technique of carrying out the spray of the cracked gas immediately after considering as a means to stop pressure loss low, and coming out of a catalyst inside a catalyst container (5) with a liquid is selected. Although a stable liquid is used for this liquid chemically [water etc.], it can realize relief of much more corrosive environment by mixing alkali and neutralizing a halogen and a hydrogen halide partially.
[0038] Since it mixes into a catalyst, and the temperature of a catalyst may be reduced or the droplet of a spray may reduce the activity of a catalyst when carrying out the spray of the liquid inside [in which the catalyst was installed] a container, in this invention, it prevents that the droplet mixes in a catalyst by installing a baffle plate (6) between a catalyst and spray space.
[0039] moreover, in carrying out the spray of the liquid inside [in which the catalyst was installed] a container Since a new cauterization occurrence factor will be produced by carrying in hygroscopic moisture into this piping that the droplet of a spray shifts into piping which connects the scrubbing tower (8) by the side of the lower stream of a river with the container which installed the catalyst, and is originally drying, In this invention, by establishing the parvus separation room (7) of the rate of flow in the interior of a container in which the catalyst was installed, the droplet in the air is made to sediment and it prevents that the droplet shifts to down-stream piping.
[0040] With a catalyst container (5), cooling or after neutralizing partially, as for cracked gas, a hydrogen halide (HCl, HF) is completely removed by the scrubbing tower (8) of the following process. It adsorbs by the adsorption tower (9) with which non-decomposed chlorofluocarbon filled up the active carbon which ****** rare ** installed in the lower-stream-of-a-river side of a scrubbing tower (8) in this invention into the cracked gas discharged from a scrubbing tower (8), and the chlorofluocarbon from which it secedes after that at the time of regeneration of active carbon is returned to a catalyst container (5), and is processed again. Furthermore, in this invention, the chlorofluocarbon which was reproduced and was desorbed from the adsorption tower (9) is processed, without suspending decomposition processing of the chlorofluocarbon which is a main decomposition processing object by reproducing the one remaining sequence and introducing into a catalyst on stream the chlorofluocarbon from which it was reproduced and desorbed, while using 2 system ****** and one sequence for adsorption for this adsorption tower (9).
[0041] Circulation liquid is supplied to the scrubbing tower (8) by the flow rate of about 1.3m3/h using the circulation tub (10) and the circulating pump (11). This is introduced into a catalyst container (5), combines with the circulation liquid of about 1.2m3/h supplied to a catalyst container (5) as spray liquid, and circulates through the whole system as circulation liquid of about 2.5m3/h of the sums. It is necessary to set the amount of circulation liquid flows as the amount which ebullism and vaporization do not produce by the contact to about 450-degree C chlorofluocarbon decomposition exhaust gas introduced into a scrubbing tower (8), and it serves as about 2.5m3/h in this example.
[0042] In the circulation tub (10), with the alkali hopper (12), 1 54.3kg [/] over% which is 53.8kg/h whose powdered calcium hydroxides are the required equivalent of a detrimental component is supplied to circulation liquidh, and circulation liquid is adjusted to it alkaline. Since this addition is strictly performed by the micro feeder, 1% is exceeded and it is not added superfluously.
[0043] For a parvus reason, in this example, the flow rate of a scrubbing tower (8) of circulation liquid is a spray tower, the harmful gas in chlorofluocarbon decomposition exhaust gas is absorbed in circulation liquid in a spray, and it neutralizes with the calcium hydroxide in circulation liquid further, and hydrogen fluoride generates a calcium fluoride and a hydrogen chloride generates a calcium chloride. The material of a scrubbing tower (8) is carrying out Teflon coating of the internal surface of parietal bone for the corrosion prevention by the detrimental component introduced into a scrubbing tower (8).
[0044] Although the yields of these saturation products (a calcium fluoride, calcium chloride) are 14.2kg [h] /and 60.5kg/h,

respectively Since the solubility of a calcium fluoride is as small as an about 15-20g[/m]3-solution near [concerned] temperature and the solubility of a calcium chloride is as large as an about 400-500kg[/m]3-solution near [concerned] temperature, the inside of the circulation liquid of about 2.5m3/h -- the most exists and, as for a calcium chloride, in a calcium fluoride, the most exists as a soluble salt as an undissolved solid Moreover, the concentration in the inside of each liquid is about 0.6 % of the weight and about 2.3 % of the weight.

[0045] The circulation liquid which contains a calcium fluoride and a calcium chloride by the aforementioned amount and concentration is introduced into the back slurry supply tub (13) discharged from the scrubbing tower (8). In a slurry supply tub (13), circulation liquid is the cooling coil (14) installed in the interior of a slurry supply tub (13), and is cooled to the temperature suitable for dehydration of a back process, and the electrodialyses while it piles up about 30 minutes or more and a neutralization is completed in the meantime.

[0046] The circulation liquid with which saturation is completed and was cooled is introduced into the first dehydrator (16) by the first slurry feed pump (15) from a slurry supply tub (13). Circulation liquid is dehydrated by the first dehydrator (16), and, as for the calcium fluoride in circulation liquid, a water content is separated from circulation liquid with the gestalt of about 80% of a dehydration cake. Since about 2.3% of the weight of the calcium chloride is soluble in the moisture in a dehydration cake as aforementioned, the purity of the calcium fluoride at the time of drying this dehydration cake as it is is about 89%, when the calcium hydroxide which remains in circulation liquid while it has been unreacted is included, and is 95% or more widely demanded in general industries, such as a glass manufacture.

[0047] a part for the dehydration cake from which the circulation liquid with which the calcium fluoride was separated by the first dehydrator (16) was separated -- the flow rate is decreased, and it is discharged by the supernatant-liquid tub (17) from the first dehydrator (16) by the flow rate of about 2.4m3/h, and is further introduced into an electrodialyzer (19) with a waste fluid pump (18) In an electrodialyzer (19), a lysis component is removed from circulation liquid by the electrodialyses. Specifically, solubility of a calcium chloride is large, and since it exists in the type of ion, the most (about 90%) is removed. It is similarly removed about a melted part of a calcium fluoride.

[0048] From an electrodialyzer (19), the calcium chloride removed from circulation liquid is discharged by the flow rate of about 0.5m3/h as concentration liquid whose concentration is about 9 % of the weight. Since concentration is comparatively high, the concentration liquid of this calcium chloride is set and reused [collect and] to this example. It is also possible to condense further, to dry this and to collect calcium chlorides as a solid. Moreover, F+ ion concentration has the solubility of CaF2 as small as about 8 ppm, and since a solid content does not exist, either, 15 ppm of effluent standards can be satisfied.

[0049] On the other hand, the calcium chloride which is a lysis component is separated, the concentration of a calcium chloride serves as the clear liquid purified with about 0.2 % of the weight which is about 1 before electrodialysis processing/10, and the circulation liquid which passed the electrodialyzer (19) is introduced into a rinse tub (21) with a clear liquid pump (20) by the flow rate of about 1.8m3/h. The calcium-fluoride dehydration cake separated into the rinse tub (21) from circulation liquid from the first dehydrator (16) is also introduced, and clear liquid and a dehydration cake are mixed inside a rinse tub (21). The calcium chloride of about 2.3 % of the weight of the concentration in a dehydration cake is diluted with clear liquid of about 0.2 % of the weight of concentration, and reduces the concentration to about 0.3 percentage by weight.

[0050] The interflow field of a calcium-fluoride dehydration cake and clear liquid is introduced into the second dehydrator (23) by the second slurry feed pump (22) from a rinse tub (21) as circulation liquid. Circulation liquid is again dehydrated in the second dehydrator (23), and, as for fluoride ********, a water content is separated from circulation liquid as about 80% of a dehydration cake. Since circulation liquid is reduced to about 0.3% of the weight in the calcium chloride concentration in the rinse tub (21), the calcium chloride in a dehydration cake will also decrease and the purity of the calcium fluoride at the time of drying this will fully exceed 97% and 95% of required purity by the case where the aforementioned calcium hydroxide is included.

[0051] The circulation liquid with which the calcium fluoride was separated by the second dehydrator (23) uses both calcium fluoride and calcium chloride as the clear liquid by which separation elimination was carried out, is discharged by the circulation tub (10) by the flow rate of about 1.8m3/h, has alkali again added by the alkali hopper (12), and is reused as circulation liquid.

[0052] in addition, the flow rate of the circulation liquid which the flow rate of the circulation liquid introduced into a scrubbing tower (8) from a circulation tub (10) is about 2.5m3/h in this example, and is introduced into a circulation tub (10) from the second dehydrator (25) -- about 1.8m3/h and circulation liquid -- about 0.7m3/h per circulation -- in order to reduce the flow rate, an insufficiency will be filled up in the suitable part on a circulation tub and other circulation lines

[0053] (Example 2) this example is an example which processes the chlorofluocarbon decomposition exhaust gas generated when the chlorofluocarbon decomposition processor which carries out decomposition processing of the chlorofluocarbon with the processing speed of 50kg/h using a catalyst decomposes chlorofluocarbon 12 (CCl2F2). A schematic diagram is shown in drawing 2 .

[0054] Chlorofluocarbon is introduced into a catalyst column (5) by back one mol % of the concentration mixed with the heated air and the steam. In a catalyst column, chlorofluocarbon is understood an added water part and hydrogen fluoride and 16.5kg /of 30.2kg /of hydrogen chlorides generate ith h as a harmful gas, respectively.

[0055] the air of about 800Nm3/h these [whose] are carrier gas, and decomposition -- secondary -- it is introduced into a scrubbing tower (8) with the little steam which is degree product, a carbon dioxide, a carbon monoxide, etc. The temperature of chlorofluocarbon decomposition exhaust gas is about 440 degrees C, in order to apply the heat of decomposition of chlorofluocarbon to heating temperature.

[0056] Circulation liquid is supplied to the scrubbing tower (8) by the flow rate of about 6.0m3/h using the circulation tub (10)

and the circulating pump (11).
[0057] With the alkali hopper (12), 1 61.7kg [/] over% (0.6kg/(h)) which is 61.1kg/h whose powdered calcium hydroxides are the saturation required equivalent of cracked gas is suppliedh, and circulation liquid is adjusted [in / the circulation tub (11) / in circulation liquid] alkaline. At this example, in order for a cheap rotary feeder to perform this addition, strict superfluous 1% addition is difficult, for this reason, an addition is considered as 1% or more of a superfluous setup, and a back process (24, 25) realizes the strict superfluous status 1% by PH adjustment by the acid.
[0058] Since the flow rate of circulation liquid is large in this example, a scrubbing tower (8) is a packed column method, the harmful gas in chlorofluocarbon decomposition exhaust gas is absorbed in circulation liquid in a filler, and it neutralizes with the calcium hydroxide in circulation liquid further, and hydrogen fluoride generates a calcium fluoride and a hydrogen chloride generates a calcium chloride. The material of a filler is using plastic material for the corrosion prevention by the detrimental component introduced into a scrubbing tower (8). The material of a scrubbing tower (8) is the same as that of an example 1.
[0059] the yield of these saturation products (a calcium fluoride, calcium chloride) -- respectively -- 32.2kg [h] /and 45.9kg/h -- it is -- the inside of the circulation liquid of about 6.0m3/h -- the most exists and, as for a calcium chloride, in a calcium fluoride, the most exists as a soluble salt (ion) as a solid Moreover, the concentration in the inside of each liquid is about 0.5 % of the weight and about 0.7 % of the weight.
[0060] The circulation liquid which contains a calcium fluoride and a calcium chloride by the aforementioned amount and concentration is introduced into the back slurry supply tub (13) discharged from the scrubbing tower (8). In a slurry supply tub (13), circulation liquid is cooled to the temperature which was suitable for dehydration and the electrodialyses by the cooling coil (14) installed in the interior of a slurry supply tub (13) while it piles up about 30 minutes or more and a neutralization is completed in the meantime.
[0061] Although the circulation liquid with which saturation is completed and was cooled is introduced into the first dehydrator (16) by the first slurry feed pump (15) from a slurry supply tub (13), since alkali is superfluously added as aforementioned, by this example, the calcium hydroxide remains superfluously. Therefore, when calcium fluorides are collected as it is, a calcium hydroxide will mix in the collected calcium fluoride, and the purity of the collected calcium fluoride will be spoiled. In this example, the degree of overalkali is adjusted to 1% by adding a hydrochloric acid through the flow control valve (25) which detected PH of circulation liquid with PH meter (24) at the slurry supply tub (13) outlet, and controlled the opening by feedback control for **.
[0062] Circulation liquid is dehydrated for the circulation liquid which had alkalinity adjusted by the first dehydrator (16), and, as for the calcium fluoride in circulation liquid, a water content is separated from circulation liquid with the gestalt of about 80% of a dehydration cake. 95% or more which is about 95% including the calcium hydroxide which adds to 0.6 overkg/h in order that the purity of a calcium fluoride may perform dehydration and an electrodialyses efficiently, even if it dries this dehydration cake as it is, although about 0.7% of the weight of the calcium chloride is melting as the above [moisture / in a dehydration cake], and remains in circulation liquid while it has been unreacted, and is widely demanded in general industries, such as a glass manufacture, is satisfied. Therefore, in this example, washing-in-cold-water operation is unnecessary.
[0063] a part for the dehydration cake from which the circulation liquid with which the calcium fluoride was separated by the first dehydrator (16) was separated -- the flow rate is decreased, and it is discharged by the supernatant-liquid tub (17) from the first dehydrator (16) by the flow rate of about 5.8m3/h, and is further introduced into an electrodialyzer (19) with a waste fluid pump (18) In an electrodialyzer (19), a calcium chloride is removed from circulation liquid by the electrodialyses.
[0064] From an electrodialyzer (19), the calcium chloride removed from circulation liquid is discharged by the drainage tub (27) by the flow rate of about 1.0m3/h with a concentration liquid pump (26) as concentration liquid whose concentration is about 3 % of the weight. Since concentration is comparatively low, the concentration liquid of this calcium chloride is discharged as drainage by this example. In case of drainage, by the ion exchange membrane of an electrodialyzer (19), the calcium fluoride of the shape of a detailed solid is removed, the fluorine concentration under drainage has the solubility of the calcium fluoride melted further fully smaller than the regulation value of Water Pollution Control Law, and it does not need special fluorine elimination operation from 8 ppm and a small thing.
[0065] The calcium chloride which is a lysis component is separated, and calcium chloride concentration serves as the clear liquid purified with about 0.1 % of the weight which is about 1 before electrodialysis processing/10, and the circulation liquid which passed the electrodialyzer (19) on the other hand is introduced into a circulation tub (10) with a clear liquid pump (20) by the flow rate of about 4.8m3/h, has alkali again added by the alkali hopper (11), and is reused as circulation liquid.
[0066] (Example 3) this example is an example which processes the chlorofluocarbon decomposition exhaust gas generated when the chlorofluocarbon decomposition processor which carries out decomposition processing of the chlorofluocarbon HFC with the processing speed of 50kg/h using a catalyst decomposes chlorofluocarbon 134a. Since HFC does not contain chlorine, although there are no worries about an ozone crack, since there is the warming effect, it is detrimental from global-warming prevention, and there is the need for harmless-izing. A decomposition formula serves as $2CF_3CH_2F+2H_2O+3O_2 \rightarrow 8HF+4CO_2$.
[0067] A schematic diagram is shown in drawing 3 . After supplying the air of about 260Nm3/h to a heater (2) with a blower (1) and heating it as carrier gas of chlorofluocarbon, chlorofluocarbon is heated to the temperature of about 430 degrees C required for the decomposition by the catalyst by mixing the steam supplied through a flow control valve (3), and the chlorofluocarbon supplied through a flow control valve (4). The concentration of chlorofluocarbon is about three mol %.
[0068] what is used in order that a steam may supply hydrogen required for the decomposition by the catalyst of chlorofluocarbon, and oxygen -- it is -- the modality of chlorofluocarbon, and a throughput -- responding -- 1.0- of the equivalent required for

decomposition -- it supplies about 3.0 times The amount of supply of a steam is controlled to go into this domain.
[0069] Since temperature falls by mixture with chlorofluocarbon, the air before mixture sets up the temperature of the air before mixture more highly from temperature required for the decomposition by the catalyst so that it may become more than the temperature that needs the temperature after the mixture with chlorofluocarbon for the decomposition by the catalyst of chlorofluocarbon. Moreover, the temperature of the air before mixture sets up the amount of supply of air and a steam so that the partial decomposition temperature of chlorofluocarbon may not be exceeded, and it controls each amount of supply. Moreover, the output of a heater (2) is controlled for the temperature of air to become below the partial decomposition temperature of chlorofluocarbon, and to become more than the temperature which needs the temperature after the mixture with chlorofluocarbon for the decomposition by the catalyst of chlorofluocarbon.
[0070] Since a steam generates the heating means of a heater (2) as products of combustion using the combustion burner which used the hydrocarbon propellant, it can fill up a steam required for a decomposition reaction. Moreover, the method which heats indirectly the air which is carrier gas by combustion gas as a heat exchanger formula may be used. In this case, it is convenient, when maintaining a catalyst performance for a long period of time, since combustion gas etc. does not mix.
[0071] The mixed gas of the air and the steam which were heated by the predetermined temperature requirement, and chlorofluocarbon is introduced into a catalyst container (5), and is decomposed into hydrogen fluoride, a carbon dioxide, etc. by catalytic reaction. Decomposition-reaction heat is applied in heated temperature of about 430 degrees C, and the exhaust gas after decomposition is discharged at about 450 degrees C. 39.1kg /of hydrogen fluoride is generatedh.
[0072] Since corrosive is very high, the hot hydrogen fluoride generated by decomposition eases the corrosive environment of the equipment after it in this invention by cooling the cracked gas with corrosive [hot] in the interior of a catalyst container (5).
[0073] The domain with a severe corrosive environment is made into the minimum as a means of cooling, and the technique of carrying out the spray of the cracked gas immediately after considering as a means to stop pressure loss low, and coming out of a catalyst inside a catalyst container (5) with a liquid is selected. Although a stable liquid is used for this liquid chemically [water etc.], it can realize relief of much more corrosive environment by mixing alkali and neutralizing hydrogen fluoride partially.
[0074] Since it mixes into a catalyst, and the temperature of a catalyst may be reduced or the droplet of a spray may reduce the activity of a catalyst when carrying out the spray of the liquid inside [in which the catalyst was installed] a container, in this invention, it prevents that the droplet mixes in a catalyst by installing a baffle plate (6) between a catalyst and spray space.
[0075] With a catalyst container (5), cooling or after neutralizing partially, as for exhaust gas, a hydrogen halide (hydrogen fluoride) is completely removed by the scrubbing tower (8) of the following process. To the cracked gas discharged from a scrubbing tower (8), what non-decomposed chlorofluocarbon adsorbed by the adsorption tower (9) into which ****** rare ** filled up with this invention the active carbon installed in the lower-stream-of-a-river side of a scrubbing tower (8), and was reproduced is processed again. The decomposition luminous efficacy as a processing facility can be improved by this, and the amount of exudation non-decomposed chlorofluocarbon can be reduced to 10 by about 1/. This effect twists non-decomposed chlorofluocarbon to pass a catalyst bed again. In this case, non-decomposed chlorofluocarbon is the lower stream of a river of a heater, and is supplied to the upstream of a catalyst. If this is supplied to the upstream of a heater, since it is over 700 degrees C which is the pyrolysis start temperature of chlorofluocarbon partially in the heater, when non-decomposed chlorofluocarbon is supplied to the upstream of a heater, it is to pyrolyze a part of chlorofluocarbon and for a corrosive gas (HF) to occur. More nearly thereby than a catalyst bed, occurrence of the corrosive gas by the side of the upstream can be prevented, and enhancement in the endurance of a facility and use evasion of a high-class corrosion resisting material can be performed.
[0076] Furthermore, in this invention, the chlorofluocarbon which was reproduced and was desorbed from the adsorption tower (9) is processed, without suspending decomposition processing of the chlorofluocarbon which is a main decomposition processing object by reproducing the one remaining sequence and introducing into a catalyst on stream the chlorofluocarbon from which it was reproduced and desorbed, while using 2 system ****** and one sequence for adsorption for this adsorption tower (9).
[0077] Circulation liquid is supplied to the scrubbing tower (8) by the flow rate of about 1.3m3/h using the circulation tub (10) and the circulating pump (11). This is introduced into a catalyst container (5), combines with the circulation liquid of about 1.2m3/h supplied to a catalyst container (5) as spray liquid, and circulates through the whole system as circulation liquid of about 2.5m3/h of the sums. It is necessary to set the amount of circulation liquid flows as the amount which ebullism and vaporization do not produce by the contact to about 450-degree C chlorofluocarbon decomposition exhaust gas introduced into a scrubbing tower (8), and it serves as about 2.5m3/h in this example.
[0078] In the circulation tub (10), with the alkali hopper (12), 1 73.0kg [/] over% which is 72.3kg/h whose powdered calcium hydroxides are the required equivalent of a detrimental component is supplied to circulation liquidh, and circulation liquid is adjusted to it alkaline. Since this addition is strictly performed by the micro feeder, it is not added by the luxus.
[0079] For a parvus reason, in this example, the flow rate of a scrubbing tower (8) of circulation liquid is a spray tower, the harmful gas in chlorofluocarbon decomposition exhaust gas is absorbed in circulation liquid in a spray, it neutralizes with the calcium hydroxide in circulation liquid further, and hydrogen fluoride generates a calcium fluoride. The material of a scrubbing tower (8) is carrying out Teflon coating of the internal surface of parietal bone for the corrosion prevention by the detrimental component introduced into a scrubbing tower (8).
[0080] Although the yield of these saturation products is 14.0kg/h, the solubility of a calcium fluoride is as small as an about 15-20g[/m]3-solution near [concerned] temperature, and, as for a calcium fluoride, the most exists as a solid in the circulation liquid of about 2.5m3/h. Moreover, the concentration in the inside of liquid is about 0.6 % of the weight.

[0081] The circulation liquid which contains a calcium fluoride by the aforementioned amount and concentration is introduced into the back slurry supply tub (13) discharged from the scrubbing tower (8). In a slurry supply tub (13), circulation liquid is the cooling coil (14) installed in the interior of a slurry supply tub (13), and is cooled to the temperature suitable for dehydration of a back process while it piles up about 30 minutes or more and a neutralization is completed in the meantime.
[0082] The circulation liquid with which saturation is completed and was cooled is introduced into the first dehydrator (16) by the first slurry feed pump (15) from a slurry supply tub (13). Circulation liquid is dehydrated by the first dehydrator (16), and, as for the calcium fluoride in circulation liquid, a water content is separated from circulation liquid with the gestalt of about 80% of a dehydration cake. Since there is no impurity in the moisture in a dehydration cake except [most] a calcium fluoride, even if the purity of the calcium fluoride at the time of drying this dehydration cake as it is includes the calcium hydroxide which adds superfluously, and remains in circulation liquid while it has been unreacted, it is 95% or more widely demanded in general industries, such as a glass manufacture, and can collect the calcium fluorides with high purity.
[0083] a part for the dehydration cake from which the circulation liquid with which the calcium fluoride was separated by the first dehydrator (16) was separated -- the flow rate is decreased, and it is discharged by the supernatant-liquid tub (17) from the first dehydrator (16) by the flow rate of about 2.4m3/h, and is further returned to a circulation tub (10) with a waste fluid pump (18)
[0084] The circulation liquid with which the calcium fluoride was separated by the dehydrator (16) is discharged by the circulation tub (10) by the flow rate of about 2.4m3/h, has alkali again added by the alkali hopper (12), and is reused as circulation liquid.
[0085] in addition, the flow rate of the circulation liquid which the flow rate of the circulation liquid introduced into a scrubbing tower (8) from a circulation tub (10) is about 2.5m3/h in this example, and is introduced into a circulation tub (10) from a dehydrator (16) -- about 2.4m3/h and circulation liquid -- about 0.1m3/h per circulation -- in order to reduce the flow rate, an insufficiency will be filled up in the suitable part on a circulation tub and other circulation lines
[0086] (Example 4) this example is an example which processes the chlorofluocarbon decomposition exhaust gas generated when the chlorofluocarbon decomposition processor which carries out decomposition processing of the chlorofluocarbon with the processing speed of 50kg/h using a catalyst decomposes chlorofluocarbon 11 using the sodium-hydroxide aqueous solution. The schematic diagram is the same as that of drawing of an example 1.
[0087] After supplying the air of about 260Nm3/h to a heater (2) with a blower (1) and heating it as carrier gas of chlorofluocarbon, chlorofluocarbon is heated to the temperature of about 430 degrees C required for the decomposition by the catalyst by mixing the steam supplied through a flow control valve (3), and the chlorofluocarbon supplied through a flow control valve (4). The concentration of chlorofluocarbon is about three mol %.
[0088] what is used in order that a steam may supply hydrogen required for the decomposition by the catalyst of chlorofluocarbon, and oxygen -- it is -- the modality of chlorofluocarbon, and a throughput -- responding -- 1.0- of the equivalent required for decomposition -- it supplies about 3.0 times The amount of supply of a steam is controlled to go into this domain.
[0089] The mixed gas of the air and the steam which were heated by the predetermined temperature requirement, and chlorofluocarbon is introduced into a catalyst container (5), and is decomposed into a hydrogen chloride, hydrogen fluoride, a carbon dioxide, etc. by catalytic reaction. Decomposition-reaction heat is applied in heated temperature of about 430 degrees C, and the exhaust gas after decomposition is discharged at about 450 degrees C. Hydrogen fluoride and 7.3kg /of 39.8kg /of hydrogen chlorides are generatedh h, respectively.
[0090] With a catalyst container (5), cooling or after neutralizing partially, as for exhaust gas, a hydrogen halide is completely removed by the scrubbing tower (8) of the following process.
[0091] Circulation liquid is supplied to the scrubbing tower (8) by the flow rate of about 1.3m3/h using the circulation tub (10) and the circulating pump (11). This is introduced into a catalyst container (5), combines with the circulation liquid of about 1.2m3/h supplied to a catalyst container (5) as spray liquid, and circulates through the whole system as circulation liquid of about 2.5m3/h of the sums. It is necessary to set the amount of circulation liquid flows as the amount which ebullism and vaporization do not produce by the contact to about 450-degree C chlorofluocarbon decomposition exhaust gas introduced into a scrubbing tower (8), and it serves as about 2.5m3/h in this example.
[0092] In the circulation tub (10), with the alkali hopper (12), 1 64.6kg [/] over% which is 64.0kg/h whose powdered sodium hydroxides are the required equivalent of a detrimental component is supplied to circulation liquidh, and circulation liquid is adjusted to it alkaline. Since this addition is strictly performed by the micro feeder, it is not added by the luxus.
[0093] For a parvus reason, in this example, the flow rate of a scrubbing tower (8) of circulation liquid is a spray tower, the harmful gas in chlorofluocarbon decomposition exhaust gas is absorbed in circulation liquid in a spray, and it neutralizes with the sodium hydroxide in circulation liquid further, and hydrogen fluoride generates a sodium fluoride and a hydrogen chloride generates a sodium chloride.
[0094] Although the yields of these saturation products (a sodium fluoride, sodium chloride) are 33.6kg [h] /and 46.8kg/h, respectively Since the solubility of a sodium fluoride is comparatively as small as an about 40kg[/m]3-solution near [concerned] temperature and the solubility of a sodium chloride is as large as an about 260kg[/m]3-solution near [concerned] temperature, the inside of the circulation liquid of about 2.5m3/h -- the most exists, and from eye the 3rd order, as an undissolved solid, since solubility of a sodium chloride is large, as for a sodium fluoride, the most exists as a soluble salt Moreover, the concentration in the inside of each liquid is about 1.3 % of the weight and about 1.8 % of the weight.
[0095] The circulation liquid which contains a sodium fluoride and a sodium chloride by the aforementioned amount and concentration is introduced into the back slurry supply tub (13) discharged from the scrubbing tower (8). In a slurry supply tub

(13), circulation liquid is the cooling coil (14) installed in the interior of a slurry supply tub (13), and is cooled to the temperature suitable for dehydration of a back process, and the electrodialyses while it piles up about 30 minutes or more and a neutralization is completed in the meantime.

[0096] The circulation liquid with which saturation is completed and was cooled is introduced into the first dehydrator (16) by the first slurry feed pump (15) from a slurry supply tub (13). Circulation liquid is dehydrated by the first dehydrator (16), and, as for the sodium fluoride in circulation liquid, a water content is separated from circulation liquid with the gestalt of about 80% of a dehydration cake. Since about 1.8% of the weight of the sodium chloride is soluble in the moisture in a dehydration cake as aforementioned, the purity of the sodium fluoride at the time of drying this dehydration cake as it is is about 90%, when the sodium hydroxide which adds to 0.6 overkg/h, and remains in circulation liquid while it has been unreacted is included, in order to perform dehydration and an electrodialyses efficiently, and is 95% or more widely demanded in general industries, such as a glass manufacture.

[0097] a part for the dehydration cake from which the circulation liquid with which the calcium fluoride was separated by the first dehydrator (16) was separated -- the flow rate is decreased, and it is discharged by the supernatant-liquid tub (17) from the first dehydrator (16) by the flow rate of about 2.4m3/h, and is further introduced into an electrodialyzer (19) with a waste fluid pump (18) In an electrodialyzer (19), the separation elimination of about 90% of the lysis component of a sodium chloride and a sodium fluoride is carried out by the electrodialyses from circulation liquid.

[0098] From an electrodialyzer (19), the sodium fluoride and sodium chloride which were removed from circulation liquid are discharged by the flow rate of about 0.5m3/h as concentration liquid. Since concentration is comparatively high, the concentration liquid of this sodium fluoride and a sodium chloride is set and reused [collect and] to this example. It is also possible to condense further, to dry this and to collect a sodium chloride and sodium fluorides as a solid.

[0099] On the other hand, the circulation liquid which passed the electrodialyzer (19) separates the solid content separated by dehydration processing, and the electrodialyses carries out the separation elimination of about 90% of a lysis component, and it is clear liquid. This circulation liquid that carried out the defecation is introduced into a rinse tub (21) with a clear liquid pump (20) by the flow rate of about 1.8m3/h. The sodium-fluoride dehydration cake separated into the rinse tub (21) from circulation liquid from the first dehydrator (16) is also introduced, and clear liquid and a dehydration cake are mixed inside a rinse tub (21). The sodium chloride of about 1.3 % of the weight of the concentration in a dehydration cake is diluted with clear liquid of about 0.1 % of the weight of concentration, and reduces the concentration to about 0.2 percentage by weight.

[0100] The interflow field of a sodium-fluoride dehydration cake and clear liquid is introduced into the second dehydrator (23) by the second slurry feed pump (22) from a rinse tub (21) as circulation liquid. Circulation liquid is again dehydrated in the second dehydrator (23), and, as for a sodium fluoride, a water content is separated from circulation liquid as about 80% of a dehydration cake. Since circulation liquid is reduced to about 0.2% of the weight in the sodium chloride concentration in the rinse tub (21), the sodium chloride in a dehydration cake can also decrease and the purity of the sodium fluoride at the time of drying this can obtain the high thing of the value added fully exceeding 95%.

[0101] The circulation liquid with which the sodium fluoride was separated by the second dehydrator (23) uses both sodium fluoride and sodium chloride as the clear liquid by which separation elimination was carried out, is discharged by the circulation tub (10) by the flow rate of about 1.8m3/h, has alkali again added by the alkali hopper (12), and is reused as circulation liquid.

[0102] in addition, the flow rate of the circulation liquid which the flow rate of the circulation liquid introduced into a scrubbing tower (8) from a circulation tub (10) is about 2.5m3/h in this example, and is introduced into a circulation tub (10) from the second dehydrator (25) -- about 1.8m3/h and circulation liquid -- about 0.7m3/h per circulation -- in order to reduce the flow rate, an insufficiency will be filled up in the suitable part on a circulation tub and other circulation lines

[0103]

[Effect of the Invention] As explained above, this invention neutralizes chlorofluocarbon decomposition exhaust gas with the circulation liquid of alkali addition quantitatively and continuously, saturation products are continuously removed and collected from circulation liquid, since it is the art of the chlorofluocarbon decomposition exhaust gas which repeats and uses most circulation liquid, the decomposition exhaust gas of chlorofluocarbon is processed efficiently, if still required in the fluoride salt solid of a useful component, chlorination salts can be collected efficiently, and it is [effect / in which that it is small-scale can carry out / **** /-izing of this invention

[Translation done.]